

## **Checklist:** *Where to look for problem sources of carbon monoxide in the home*

☒ A forced air furnace is frequently the source of leaks and should be carefully inspected.

- Measure the concentration of CO in the flue gases.
- Check furnace connections to flue pipes and venting systems to outside of the home for signs of corrosion, rust, gaps or holes.
- Check furnace filters and filtering systems for dirt or blockages.
- Check forced air fans for proper installation and correct air flow of flue gases. Improper furnace blower installation can result in carbon monoxide build-up, because toxic gas is blown into rather than out of the house.
- Check the combustion chamber and internal heat exchanger for cracks, metal fatigue or corrosion—be sure they are clean and free of debris.
- Check burners and ignition system. A flame that is mostly yellow in color in natural gas-fired furnaces is often a sign fuel is not burning completely and higher levels of carbon monoxide are being released. Oil furnaces with similar problems can give off an "oily" odor. Remember, you can't smell carbon monoxide.

☒ Check all venting systems to the outside, including flues and chimneys for cracks, corrosion, holes, debris or blockages. Animals and birds can build nests in chimneys, preventing gases from escaping.

☒ Check all other appliances that use flammable fuels such as natural gas, oil, wood or kerosene.

- Appliances include water heaters, clothes dryers, kitchen ranges, ovens or cooktops, wood burning stoves, gas refrigerators.
- Pilot lights can be a source of carbon monoxide because the by-products of combustion are released inside the home rather than vented to the outside.

☒ Be sure space heaters are vented properly. Unvented space heaters that use a flammable fuel such as kerosene can release carbon monoxide into the home.

☒ Barbecue grills should never be operated indoors. Stove tops or ovens that operate on flammable fuels should not be used to heat a residence.

☒ Check fireplaces for closed, blocked or bent flues, soot and debris.

☒ Check the clothes dryer vent opening outside the house for lint.

***If initial testing does not confirm the presence of carbon monoxide, there may be several reasons:***

☒ Testing equipment used to measure the presence of carbon monoxide in the air must be calibrated to sense low levels of CO gas concentration.

- Some detection devices only measure concentrations of 1,000 parts per million and higher, significantly above safe levels. Testing equipment should

standards for residential carbon monoxide detectors require them to alarm before 90 minutes of exposure to 100 parts per million of carbon monoxide.

- If initial readings don't reveal sufficient concentrations of carbon monoxide to set off the alarm, digital measurement testing equipment that produces a printed 24-hour record can be used to help identify the source.

☒ If doors or windows are left open, or appliances are turned off and outside air enters the home, carbon monoxide can dissipate. This creates a lower reading than the level that triggered the alarm.

- To help assure proper measurement, carbon monoxide readings should be conducted as soon as possible, after evacuating the home. Leaving doors and windows shut when evacuating can help ensure an accurate reading of CO in the home.

☒ If appliances, flues and chimneys are confirmed to be in good working order, the source of carbon monoxide leaks may be from backdrafting. This condition exists primarily in newer, more energy-efficient, "airtight" homes. Flue gases normally vent to the outside through flues and chimneys. As temperatures drop at night, air pressure inside an airtight home may become lower than outside, causing flue gases that normally exit the house to turn around and flow back down the pipes.

Inadequate air supply in a room where two or more combustion-driven appliances share the same air source, such as a water heater and furnace in a utility closet, can create a more complicated form of backdrafting called reverse stacking.

- This occurs when one appliance, such as the furnace, turns on and is unable to get adequate fresh air. When the furnace operates, it then draws contaminated air from the water heater exhaust and spreads polluted air throughout the house.

**Note:** Because carbon monoxide accumulates in a First Alert detector over time, as it does in the bloodstream, the source of CO may be appliances that were running *before* the alarm sounded.

☒ A sticking thermostat can keep the furnace running continually, depleting the oxygen supply inside the house. This can lead to backdrafting.

☒ In multiple family dwellings where living spaces share walls and pipes, carbon monoxide from one unit may go into a neighboring space through floor boards, cracks or underneath doors.

☒ If a home has an attached garage, carbon monoxide produced by car exhaust can leak into the house. This is especially a problem for home mechanics who may run the car engine frequently for periods of time—even if the garage door is left open.

## **First Alert®**

*...Because your family comes first!*

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## ***What is carbon monoxide and who is at risk?***

Carbon monoxide (CO) is a colorless, odorless deadly gas. Because you can't see, taste or smell it, carbon monoxide can kill you before you know it's there.

Everyone is at risk for carbon monoxide poisoning. Experts believe, however, that individuals

with greater oxygen requirements such as unborn babies, infants, children, senior citizens and people with coronary or respiratory problems are at greater risk.

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## ***Why is carbon monoxide so dangerous?***

The great danger of carbon monoxide is its attraction to hemoglobin in the bloodstream. CO is breathed in through the lungs and bonds with hemoglobin in the blood, displacing the oxygen cells need to function. When CO is present in the air, it rapidly accumulates in the blood, forming a toxic compound known as carboxyhemoglobin (COHb).

Carboxyhemoglobin causes symptoms similar to the flu, such as headaches, fatigue, nausea, dizzy spells, confusion and irritability. As levels of COHb increase, vomiting, loss of consciousness and eventually brain damage or death can result.

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## ***Where does carbon monoxide come from?***

Carbon monoxide is a by-product of combustion, present whenever fuel is burned. It is produced by common home appliances, such as gas or oil furnaces, refrigerators or clothes dryers, water heaters, fireplaces, charcoal grills, gas ranges, wood burning stoves and space heaters. Fumes from automobiles also contain carbon monoxide and can enter a home through walls or doorways if a car is left running in an attached garage.

All of these sources can contribute to a CO problem in the home. If a home is vented properly

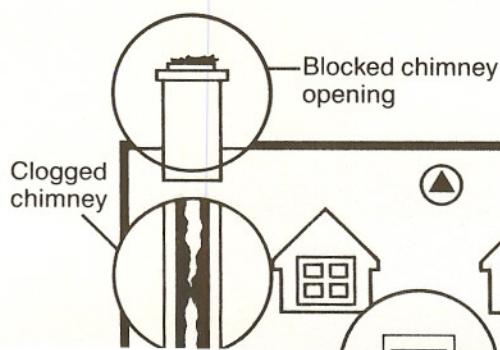
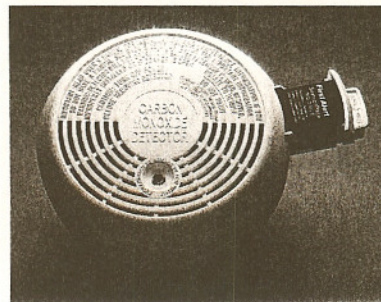
and is free from appliance malfunctions, air pressure fluctuations or airway blockages, carbon monoxide will most likely be safely vented to the outside. But in today's "energy-efficient" homes this is frequently not the case. Insulation meant to keep warm air in during winter months and cool air in during summer months can trap CO-polluted air in a home year-round. Furnace heat exchangers can crack, vents can become blocked, inadequate air supply for combustion appliances can cause conditions known as backdrafting or reverse stacking, which force contaminated air back into the home.

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## ***How can I protect myself and my family from carbon monoxide poisoning?***

The Consumer Product Safety Commission (CPSC) recommends installing at least one carbon monoxide detector per household, near the sleeping area. A second detector near the home's heat source provides extra protection. Choose an Underwriters Laboratories (UL) listed detector that sounds an audible alarm. First Alert, the leading name in home safety, manufactures a UL listed, battery operated carbon monoxide detector that continues to protect even in the event of a power outage. The First Alert model uses patented biomimetic technology, which simulates the body's response to CO and will not respond to other gases. A hardwired AC model with battery back-up is also available.

In addition to installing carbon monoxide detectors, consumers should regularly inspect and service potential problem sources of carbon monoxide.



**Potential Carbon Monoxide Sources in the Home**

## Potential Carbon Monoxide Sources in the Home

